WE CLAIM:

1. A method for non-covalently attaching a macromolecular indicator to a support comprising:

(a) providing a support surface which comprises at least one polymer;

(b) changing the integrity of the polymer to provide loosened polymer chains that form at least one interlacing area;

(c) providing at least one macromolecular indicator or monomers thereof;

(d) causing the macromolecular indicator to interlace with said at least one interlacing area, or causing the sequential polymerization of said monomers to form polymerization products which interlace with said at least one interlacing area; and

(e) causing the loosened polymer chains to tighten to produce surface immobilized indicator molecules.

2. The method of claim 1, wherein said macromolecular indicator molecule in (c) is a partially or fully polymerized indicator molecule.

3. The method of claim 1, wherein monomers of said at least one macromolecular indicator molecules are provided in (c) and are sequentially polymerized in (d).

4. The method of claim 1, wherein said support surface is hydrophobic or hydrophilic.

5. The method of claim 4, wherein said support surface is hydrophobic and said macromolecular indicator is hydrophilic.

6. The method of claim 1, wherein said support is the surface of a sensor or an optical waveguide.

7. The method of claim 1, wherein the integrity of said polymer is changed by the addition of a solvent.

8. The method of claim 7, wherein the loosened polymer chains are tightened by the substantial removal of said solvent.

9. The method of claim 8, wherein the solvent is ethanol, 2-methoxyethanol, dimethylformamide, hydroxyethyl methacrylate or mixtures thereof.

10. The method of claim 8, wherein the solvent is a hydrophilic monomer of a hydrophilic macromolecular indicator.

11. The method of claim 10, wherein the polymerization of said hydrophilic monomer with further monomers of said macromolecular indicator molecule tightens the loosened polymer chains.

12. The method of claim 10, wherein said hydrophilic monomer is 2-hydroxyethyl methacrylate or methacrylamidopropyltrimethylammonium chloride.

13. The method of claim 11, wherein said further monomer of the macromolecular indicator molecule comprises bis-carboxylate bis-boronate-anthracene.

14. The method of claim 1, wherein said macromolecular indicator has at least one reference region.

15. The method of claim 14, wherein said reference region is an excimer region.

16. The method of claim 15, wherein the excimer region is an excimer region resulting from the tertiary structure of the native macromolecular indicator.

17. The method of claim 14, wherein said reference region comprises at least one reference molecule.

18. The method of claim 1, wherein said macromolecular indicator is crosslinked by one or more crosslinkers.

19. The method of claim 18, wherein the one or more crosslinkers are ethylene glycol dimethylacrylate, trimethylolpropane trimethacrylate, para-toluene sulfonic acid or mixtures thereof.

20. The method of claim 18, wherein said at least one macromolecular indicator is crosslinked to another macromolecular indicator molecule after said at least one macromolecular indicator molecule interlaced with at least one interlacing area.

21. The method of claim 18, wherein said at least one macromolecular indicator molecule is crosslinked during sequential polymerization of the monomers of said at least one macromolecular indicator molecule.

22. A graft comprising:

a surface comprising at least one polymer, and

a macromolecular indicator molecule,

wherein said macromolecular indicator is stably interlaced with at least one chain of at least one of said polymers of the support.

23. The graft of claim 22, wherein properties of the macromolecular indicator molecule that is part of the graft substantially corresponds to the properties of said macromolecular indicator molecule before becoming part of the graft.

24. The graft of claim 22, wherein said surface is the surface of a sensor.

25. The graft of claim 22, wherein said graft is a sequential IPN.

26. The graft of claim 22, wherein said graft is an IPN.

27. A method for non-covalently attaching an indicator molecule to a sensor comprising:

(a) providing a support having a surface comprising at least one strong ionic group;

(b) adding to said surface at least one indicator molecule comprising at least one charged residue having a charge opposite of that of the ionic group of the support;

(c) immobilizing said indicator molecule on said support via an ionic bond between said ionic group of the support and said at least one charged residue.

28. The method of claim 27, wherein said ionic group is a anionic group and said at least one charged residue is a positively charged residue.

29. The method of claim 27, wherein said ionic group is sulfonate.

30. The method of claim 29, wherein said ionic group is provided by a copolymer of sulfonate and methyl methacrylate, which forms a coat on said surface.

31. A sensor for determining the presence or concentration of an analyte within a medium, said sensor comprising:

a sensor body having an outer surface surrounding said sensor body, wherein said outer surface comprises at least one polymer;

a macromolecular indicator molecule which, in response to the presence of an analyte in said medium, changes at least one measurable characteristic;

a detector which measures said changes in said at least one characteristic of said indicator molecule and which emits an output signal reflecting said changes in said indicator molecule; and

wherein said macromolecular indicator molecule is stably interlaced with at least one chain of said at least one polymer of said surface.

32. The sensor of claim 31, wherein the sensor is a optical sensor.

33. The sensor of claim 31, wherein said polymer is polymethylmethacrylate.

34. The sensor of claim 31, wherein said analyte is glucose, oxygen, carbon dioxide, nitric oxide, toxins, pH, ions and mono-or divalent cations.

35. An optical-based sensor for determining the presence or concentration of an analyte in a medium, said sensor comprising:

an optically transmissive sensor body, said sensor body having an outer surface surrounding said sensor body and wherein said outer surface comprises at least one polymer;

a radiation source in said sensor body which emits radiation within said sensor body;

a macromolecular indicator molecule having an optical characteristic that is affected by the presence or concentration of an analyte, said macromolecular indicator

molecule being positioned on said sensor body to receive radiation that travels from said radiation source, and which transmits radiation into said sensor body;

a photosensitive element located in said sensor body and positioned to receive radiation within the sensor body and which emits a signal responsive to radiation received from said indicator element; and wherein said macromolecular indicator molecule is stably interlaced with at least one chain of said at least one polymer of said surface of said sensor body.

36. A method for non-covalently attaching a macromolecular indicator to a support comprising:

(a) providing a support surface which comprises at least one polymer;

(b) changing the integrity of the polymer to provide loosened polymer chains that form at least one interlacing area;

(c) providing at least one macromolecular indicator or monomers thereof; and

(d) causing the macromolecular indicator to interlace with said at least one interlacing area, or causing the sequential polymerization of said monomers to form polymerization products which interlace with said at least one interlacing area.

37. The method of claim 36, wherein said method further comprises the step of (e) causing the loosened polymer chains to tighten to produce surface immobilized indicator molecules.

38. The method of claim 36, wherein said macromolecular indicator molecule in (c) is a partially or fully polymerized indicator molecule.

39. The method of claim 36, wherein monomers of said at least one macromolecular indicator molecules are provided in (c) and are sequentially polymerized in (d).

40. The method of claim 36, wherein said support surface is hydrophobic or hydrophilic.